Amendments to the Drawings:

Four sheets of drawings are attached including a replacement sheet and annotated sheet showing revisions to Figure 2. The replacement sheet, which includes Figs. 1 and 2, replaces the original sheet including Figs. 1 and 2. Per the Examiner's request, line S-S has been changed to line 3-3 in Figure 2.

Also included is a replacement sheet and an annotated sheet showing changes to Fig. 6. The replacement sheet, which includes only Fig. 6, replaces the original sheet containing Fig. 6. Per the Examiner's request, details C and D in Figure 6 have been changed to show fibers rather than refractory material.

Applicant respectfully submits that these amendments do not introduce any new matter but simply conform the drawings to the written description.

Attachment: 2 Replacement Sheets
2 Annotated Sheets Showing Changes

REMARKS

The drawings and specification have been amended to address the Examiner's concerns. Claim 7 has also been amended to correct a typographical error identified by the Examiner. Applicant cancels claims 10 and 12-23. It is the Applicant's understanding, however, that claim 1 is broad enough to cover the embodiment shown in Figure 10. Therefore, the cancellation of claim 10 is not intended and is not believed to be a surrender of subject matter.

Applicant also amends the claims by adding a new claim 24. Claim 24 is substantially similar to claim 1 but explicitly recites that the claimed elastic element is anisotropic. In addition, claim 24 does not use a "wherein" clause as objected to by the Examiner in claim 1.

Claims 1, 2, 8, 9, and 11 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,345,430 to Haga et al. ("Haga"). Additionally, claims 1-9 and 11 have been rejected under 35 U.S.C. § 103 as being obvious over Haga in view of Harris' Shock and Vibration Handbook. Applicant respectfully traverses all rejections under § 102(b) and § 103 as detailed below.

<u>§ 102(b) Rejections</u>

Claim 1 recites a vibration damper comprising: a hub; an inertia element; and an elastic element adapted to non-rigidly couple the hub and the inertia element; "wherein the elastic element possesses a first shear modulus in a first direction and a second shear modulus in a second direction and wherein the first shear modulus and the second shear modulus are different." The Examiner has rejected claim 1 under 102(b) as anticipated by Haga even though the Examiner admits that "Haga does not explicitly teach that the material of the elastic element possesses different first and second shear modulus in first and second directions." According to the Examiner, Haga discloses a vibration damper comprising a hub (1), an inertia element (2), and an elastic element (4) "wherein the elastic element 4 inherently possesses a first shear modulus in a first direction and a second shear modulus in a second direction and wherein the first shear modulus and the second shear modulus are different." Applicant respectfully disagrees with the Examiner's conclusion that the elastic element of Haga inherently possesses a first shear modulus in a first direction and a second shear modulus in a second direction.

Shear modulus is a physical property of a material that does not change with the shape, size, or amount of the sample. Shear modulus (G) is defined as the ratio of the shear stress (σ) to the shear strain (ε). The shear modulus of a material is determined experimentally using the following equation:

$$G = \frac{\sigma}{\varepsilon} = \frac{P/A_0}{\delta/L_0}.$$

In the equation A_0 is the test sample's *original* cross-sectional area. So, if a 1 inch by 1 inch piece of copper is used to determine the sheer modulus for copper then A_0 is 1 in^2. A_0 is a fixed value that does not change for the sample tested. P is the normal force applied for each test, δ is the change in length the sample experiences when the normal force is applied, and L_0 is the original length of the sample. Since the sample length changes proportionally to the change of the normal force with A_0 and L_0 constant, G will be a constant value.

Haga teaches an elastic element made of rubber or rubber like materials. Standard rubber is an isotropic material with a shear modulus of approximately 0.0003 GPa. An isotropic material possesses the same physical properties in all directions, so standard rubber's shear modulus in a first direction and its shear modulus in a second direction are *the same*. While increasing the amount of rubber in a particular sample may increase the sample's overall strength, the shear modulus of the rubber, which is a material property, will remain unchanged. Similarly, while changing the shape of a particular sample may increase the strength of the sample in one direction over another, the shear modulus of the sample, which is a material property, will remain unchanged. Thus, the *shear modulus* of the Haga elastic element will not change just because "the area of Haga's elastic element 4 is varied in the axial and radial directions as seen in the drawings."

The Examiner further states, citing *Texas Instrument* and *Griffin*, that claim 1 is rejected as anticipated because the "wherein" clause merely states the inherent result of the limitations set forth in the claim adds nothing to the patentability or substance of the claim. However, if a "wherein" clause provides structure or acts that are necessary to define the invention, the clause will act as a positive limitation. *Hoffer v. Microsoft Corp.*, 405 F.3d 1326 (Fed. Cir. 2005); *Fantasy Sports Properties, Inc. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1111-16 (Fed. Cir. 2002);

Griffin v. Bertina, 285 F.3d 1029, 1034 (Fed. Cir. 2002) (holding the "wherein" clause was a limiting claim element because the clause related back to and clarified what was required in the claim). The "wherein" clause in claim 1 is not merely stating an inherent result of having an elastic element 4 (as explained above), but is providing necessary structure to define the elastic element. The wherein clause of claim 1 further defines the claimed elastic element as an anisotropic material having a first shear modulus in a first direction and a different second shear modulus in a second direction.

Because Haga neither explicitly nor inherently discloses an elastic element as claimed having a first shear modulus in a first direction and a second (different) shear modulus in a second direction, Applicant respectfully submits that Haga does not anticipate claim 1. Claims 2, 8, 9, and 11 all depend from claim 1, and are therefore patentable for at least the reasons stated above.

Also Regarding claim 2, Applicant respectfully disagrees that Haga's elastic element 4 comprises a composite material. Haga does not use the term composite in the '430 patent. Haga merely mentions that the elastic element 4 is "formed from a given rubber-like elastic material (vulcanized rubber)." Vulcanized rubber is just chemically cured or crosslinked natural rubber. Just because something is rubber-like does not make it a composite. A composite material is a combination of two or more different materials that may provide superior and unique mechanical and physical properties. Haga does not teach combining any other materials with the vulcanized rubber, thus Haga does not teach that the elastic element 4 is a composite material.

§ 103 Rejections

As previously stated, the Examiner admits that "Haga does not explicitly teach that the material of the elastic element possesses different first and second shear modulus in first and second directions." Nevertheless, the Examiner rejects claim 1 as obvious under §103 arguing that (1) Harris' Shock and Vibration Handbook teaches a well-known material having different first and second shear modulus in first and second directions for damping vibration, and (2) "it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the well known material that possesses different first and second shear modulus in first and second directions in order to dampen the shock and vibration in Haga's damper as

taught or suggest by Harris." The Applicant traverses the Examiner's rejection as being based on impermissible hindsight.

First, Applicant respectfully disagrees with the Examiner's contention that Harris teaches the "well-known material (see, *e.g.*, Table 35.5 on pages 35.6 and 35.7) that possesses different first and second shear modulus in first and second directions . . . in order to dampen shock and vibration." Harris' Handbook at Table 35.5 teaches <u>fibers</u> that are "inherently anisotropic in themselves." (Harris' pg. 35.6) The portion of the Harris Handbook identified by the Examiner, however, does not appear to teach the use of the anisotropic features of those <u>fibers</u> or, more importantly, the anisotropic features of a composite in which those fibers are embedded to dampen shock and vibration in multiple directions. Furthermore, Table 35.5 as relied upon by the Examiner lists axial and transverse "elastic" modulus rather than "shear" modulus of the fibers.

Second, the Examiner fails to identify a proper motivation to combine the particular references relied on for the §103 rejection. As the Examiner admits on page 6 of the Office Action, Haga's elastic element is not an anisotropic elastic element (or even a composite). In addition, Haga does not suggest a need for an anisotropic material to provide varied damping in different directions. Thus, even assuming that Harris teaches the use of composites for damping and even assuming that the composites disclosed by Harris have anisotropic properties, there was no motivation for a person of ordinary skill in the art at the time of the invention to insert an anisotropic composite from Harris into the damper of Haga. The mere fact that both references relate generally to devices or materials for damping vibrations does not suggest that the references should be combined.

Applicant respectfully submits that the Examiner has relied upon impermissible hindsight to make the claimed combination. Prior art dampers, including Haga, have tried to dampen the vibrations about a rotating shaft by contouring or altering the geometry of the hub 1 and the inertia member 2. Altering the geometry of the hub and inertia member takes advantage of the difference between the spring rate of the elastic element in shear and the spring rate of the elastic element in compression. Specifically, the contoured shape of the hub and inertia member allows the torsional spring rate to be governed by the sheer rate of the elastic element while the bending spring rate may be governed by the modulus of compression of the elastic element. Applicant's

claimed damper, which uses an anisotropic elastic element, is much simpler and economical to manufacture than a damper with a contoured hub and inertia element. Nevertheless, neither Haga, nor Harris teaches or suggests the claimed combination. Applicant respectfully submits therefore, that the vibration damper of claim 1 is nonobvious.

Claims 2 – 9, and 11 all depend from claim 1, and are therefore patentable for at least the reasons stated above.

Also with respect to claim 2, Applicant respectfully disagrees that Haga's elastic element 4 comprises a composite material, for at least the same reasons explained above for claim 2 with respect to the § 102(b) rejection.

Additionally with respect to claims 6 and 7, Applicant respectfully disagrees that Harris' Handbook teaches fibers dispersed within the elastomer in an axial orientation that is substantially parallel to the axis of rotation or in a radial orientation with respect to the axis of rotation. The axis of rotation is the axis with respect to a rotating shaft. The last paragraph of Harris' Handbook on page 35.6 does not even mention a rotating shaft, so it is not possible for Harris' to teach any kind of alignment or orientation of the fibers with respect to an axis of rotation for a rotating shaft.

In light of the above arguments, Applicant submits that each pending claim of the application is patentable over the cited art. Accordingly, the application is believed to be in a condition for allowance, and a formal notice thereof is respectfully solicited.

The applicant(s) hereby authorizes the Commissioner under 37 C.F.R. §1.136(a)(3) to treat any paper that is filed in this application which requires an extension of time as incorporating a request for such an extension. The Commissioner is authorized to charge any additional fees required by this paper or to credit any overpayment to Deposit Account No. 20-0809.

Respectfully submitted,

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Date: January 4, 2007

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Attorney Docket No.: 02-10 (444407-00039)
Appendix to Amendment

Annotated Sheet Showing Changes

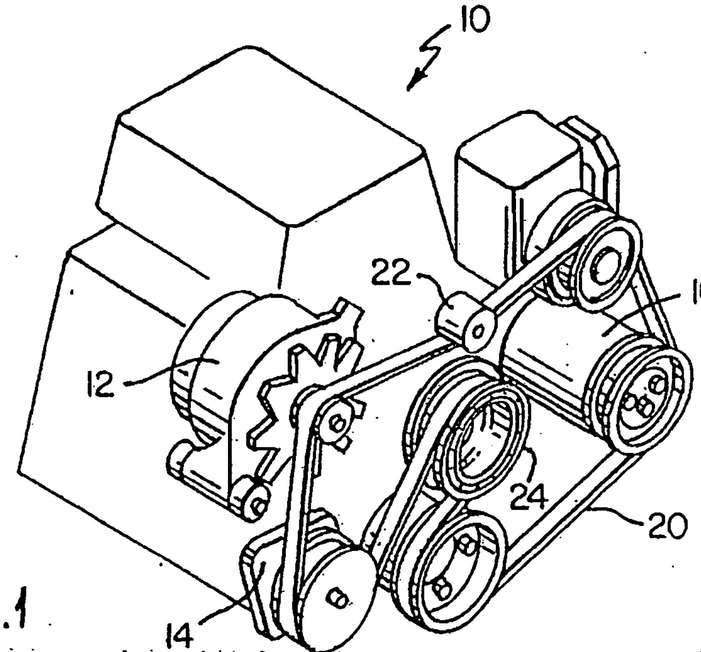

FIG.1

Line 5 changed to line 3

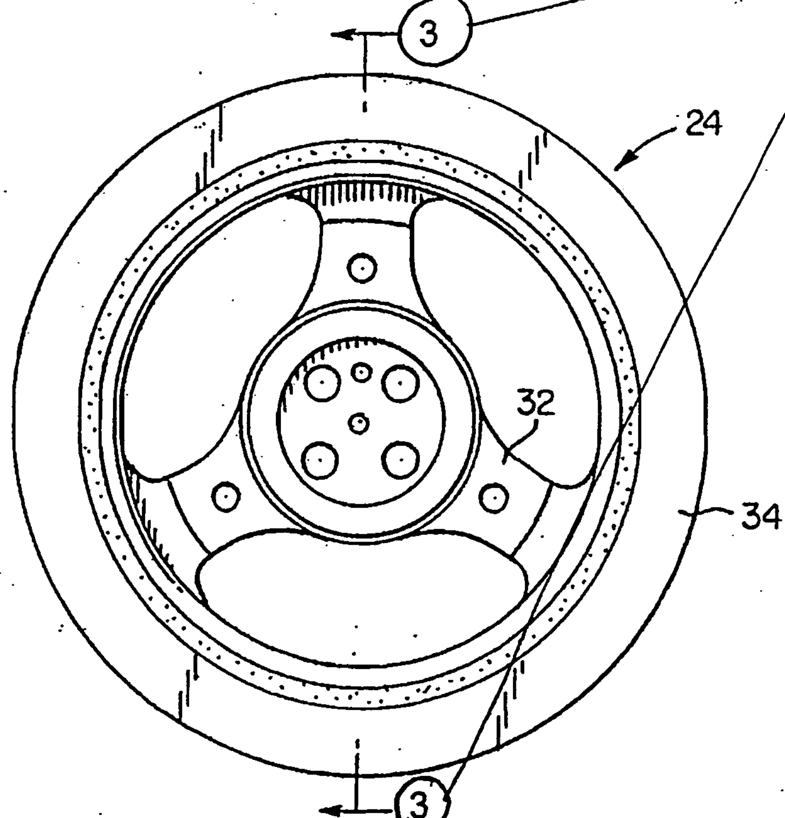

FIG.2

Annotated Sheet Showing Changes

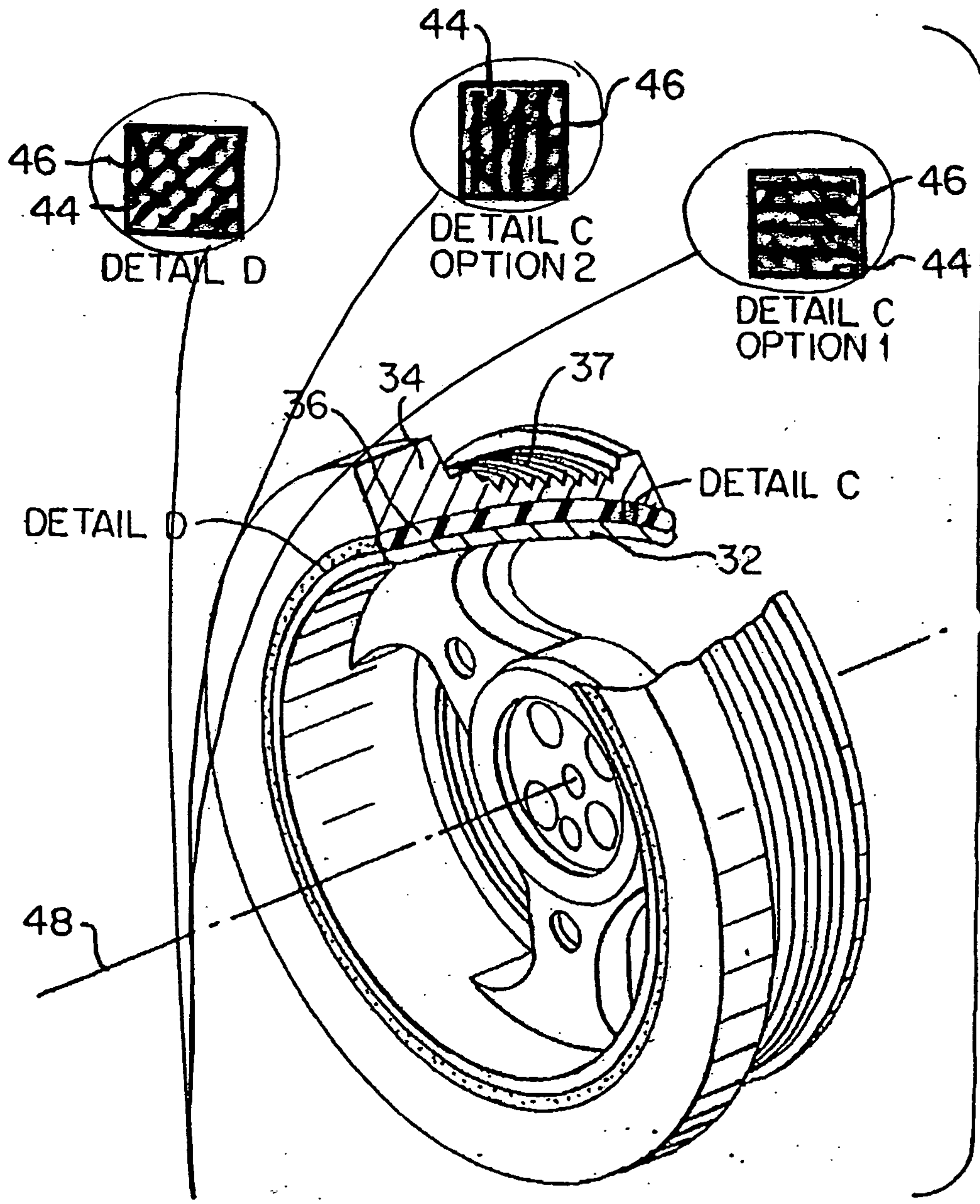

FIG.6

Details C and D have been changed from showing refractory material to showing fibers in accordance with the drawing symbols for draftsperson in MPEP 608.02.